

IN THE SPECIFICATION:

On page 1, after the title, delete line 1 and insert the following heading:

Description

BACKGROUND OF THE INVENTION

On page 2, after line 13, insert the following heading:

SUMMARY OF THE INVENTION

On page 2, lines 14-22 to page 3, lines 1-2, amend the paragraph to read as follows:

The method according to the invention makes a short welding process time possible, thanks to the fact that the oscillator is electrically braked after a controlled stimulation of oscillations and a pre-determinable oscillation time. The method according to the invention is based on recognition of the fact that the vibration is halted as immediately after the joining operation as possible, in order to avoid doing harm to the ~~join~~ joinder already effected. In addition, the controlled stimulation

of oscillations ensures that the resonant frequency is adjusted directly and in a fully automatic manner.

On page 4, lines 17-22, amend the paragraph to read as follows:

In the case of the arrangement according to the invention it is preferred to make provision for the controller to control the power-circuit output stage so that an electromagnet supporting the movement is ~~energised~~ energized in dependence on the oscillator's respective direction of movement.

On page 5, lines 11-23 to page 6, lines 1-6, amend the paragraph to read as follows:

One practical further development of the arrangement according to the invention consists in the fact that the power-circuit output stage is constituted from a first bridge arm comprising two solid-state switching devices connected in series, with parallel connected ~~free-wheeling~~ free-running diodes, and two further bridge ~~arms~~ arms which respectively comprise a series-parallel connection for a solid-state switching device and diode, that the coils of the electromagnets are connected, on the one hand, between

the junction point of the solid-state switching devices of the first bridge arm and, on the other, a respective junction point on the other bridge arms, that the solid-state switching devices of the first bridge arm are activated at the oscillation frequency and the solid-state switching devices of the other bridge arms are activated at a higher frequency than the oscillation frequency, in a pulse-width-modulated or tolerance-band-regulated manner; higher frequencies than the oscillation frequency may result, depending on the control state.

On page 6, lines 20-23 to page 7, lines 1-4, amend the paragraph to read as follows:

Even if it is not necessary to completely equip all the bridge arms with solid-state switching devices in the case of this practical embodiment of the invention, on account of the inexpensive modules that are available on the market it may be an advantage for the solid-state switching device diodes to be constituted with ~~free-wheeling~~ free-running diodes that are connected in parallel.

On page 7, lines 11-17, amend the paragraph to read as follows:

Another practical embodiment of the arrangement according to the invention consists in configuring means for constituting a trigger signal to ~~energise~~ energize the respective electromagnet in such a way that the trigger signal occurs a pre-determinable fraction, preferably one quarter, of the length of one oscillation after an oscillation's passage through zero.

On page 8, delete lines 13-15 and insert the following paragraph and heading:

~~Examples of embodiments of the invention are illustrated in the drawing by means of several figures, and explained in more detail in the following description. In the Figures:~~

For a full understanding of the present invention, reference should now be made to the following detailed description of the preferred embodiments of the invention as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

On page 8, lines 1-5, amend the paragraphs to read as follows:

Fig. 1 shows a diagrammatic view of one ~~example~~ example of a preferred embodiment, of the invention.

Fig. 2 shows a power-circuit output stage that can be used to particular advantage with the arrangement according to the invention.

On page 9, lines 1-4, amend the paragraphs to read as follows:

Fig. 3 shows time-dependency diagrams to explain the oscillation behaviour, ~~and~~ of the arrangement according to the invention.

Fig. 4 shows a view of the conductive phases of the solid-state switching devices of the power-circuit output stage of Fig. 2.

On page 9, after line 7, insert the following heading:

DESCRIPTION OF THE PREFERRED EMBODIMENTS

On page 10, lines 18-22 to page 11, lines 1-10, amend the paragraph to read as follows:

The power-circuit output stage is constituted in each case by two power transistors connected in series T1, T4, T3, T6; T5, T2, to which a respective free-wheeling diode D1, D4; D3, D6; D5, D2 is connected in parallel. The middle bridge arm T3, T6 is in each case operated at the oscillation frequency in response to the oscillator's direction of movement. To regulate the oscillation amplitude, a respective one of the transistors T5 or T4 is activated at a higher frequency in a pulse-width modulated manner or with the current tolerance-band regulated. The diodes D3 and D6, respectively, of the middle bridge arm, and diodes D2 and D1 act as ~~free-wheeling~~ free-running diodes. Details of the conductive output phases of the solid-state switching devices are explained further below in connection with Fig. 4.

On page 11, lines 11-23, to page 12, lines 1-4, amend the paragraph to read as follows:

Firstly, however, the method according to the invention will

be presented with the help of Fig. 3. Diagram a shows the temporal profile of the displacement path s of the oscillator, diagrams d and c the profile of the currents $i_L(2)$ and $i_L(3)$ of the two electromagnets 2, 3 (Fig. 1). During the first three half-waves the electromagnets are ~~energised~~ energized in such a manner that the oscillation is supported. During the third half-wave, for example at instant t_1 , a braking command is given, whereupon in the following half-wave a pause is constituted by ~~energising~~ energizing neither of the electromagnets. In the following half-waves, starting at instant t_2 , the respective electromagnet that brakes the oscillation is then ~~energised~~ energized, with the result that its amplitude decreases. As soon as the amplitude falls below a predetermined value 2_1 , 2_2 , the current is switched off in order to prevent re-stimulation in phase opposition from taking place.

On page 12, lines 5-20, amend the paragraph to read as follows:

Fig. 4 represents a time-dependency diagram of the current i , and shows as hatched areas the respective conductive phases of the solid-state switching devices. To energise

the electromagnet 2, solid-state switching device ~~device~~ device T6 is for the most part conductive during the corresponding half-wave of the phase of movement. During this time solid-state switching device T5 is cycled, and the pulse duty factor is regulated in line with the predetermined oscillation amplitude. After each occasion when the solid-state switching device T5 is switched off, the energy stored in the electromagnet causes the current to ~~free-wheel~~ free-run across the diode D2 and the solid-state switching device T6. Once the solid-state switching devices T5 and T6 have been switched off, the current flows back across the diodes D2 and D3 into the capacitor and dies away very quickly on account of the latter's voltage.

On page 13, after the last line, insert the following paragraph:

There has thus been shown and described a novel method and arrangement for friction welding which fulfills all the objects and advantages sought therefor. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this

specification and the accompanying drawings which disclose
the preferred embodiments thereof. All such changes,
modifications, variations and other uses and applications
which do not depart from the spirit and scope of the
invention are deemed to be covered by the invention, which
is to be limited only by the claims which follow.